

CLAIMS

What is claimed is:

1. A sensing apparatus comprising:
a substrate having a first side for a sensing element and a second side for electronics; and
a via making electrical contact from the first side of the substrate to the second side of the substrate,
wherein the via is hermetically sealed from the first side of the substrate to the second side of the substrate.
2. A sensing apparatus according to Claim 1, wherein the via is filled with a conductive material.
3. A sensing apparatus according to Claim 2, wherein the conductive material is a fritless ink.
4. A sensing apparatus according to Claim 3, wherein the fritless ink is a gold paste.
5. A sensing apparatus according to Claim 3, wherein the fritless ink is a platinum paste.
6. A sensing apparatus according to Claim 1, wherein the substrate is ceramic.
7. A sensing apparatus according to Claim 1, wherein the substrate is substantially 92%-96% alumina.
8. A sensing apparatus according to Claim 1, wherein the second side is covered with a lid.

9. A sensing apparatus according to Claim 8, wherein the lid is made of gold.
10. A sensing apparatus according to Claim 1, further comprising a cap covering the via.
11. A sensing apparatus according to Claim 10, wherein the cap is made from alumina.
12. A sensing apparatus according to Claim 11, wherein the alumina cap is deposited using an ion beam assist deposition process.
13. A sensing apparatus according to Claim 1, wherein the via comprises a plurality of vias.
14. A sensing apparatus according to Claim 1, wherein the substrate is annealed.
15. A method of forming an hermetically sealed substrate comprising:
 - obtaining a substrate material;
 - forming a via from a first side of the substrate to a second side of the substrate;
 - and
 - filling the via with a conductive material such that an hermetic seal forms between the first side of the substrate and the second side of the substrate.
16. A method according to Claim 15, wherein forming a via comprises laser drilling the via.
17. The method according to Claim 16, wherein forming the via further comprises annealing the substrate.
18. The method according to Claim 15, wherein filling the via comprises
 - placing a screen on a surface of the substrate;
 - pushing the conductive material through the screen such that the conductive material proceeds into the via; and

pulling a vacuum on a side of the substrate opposite the side on which the conductive material has been pushed into the via such that the conductive material coats a wall of the via.

19. The method according to Claim 18, wherein filling the via further comprises filling a meniscus that forms within the via.
20. The method according to Claim 19, wherein filling a meniscus comprises
 - putting the substrate into a vacuum;
 - printing a conductive material into the meniscus; and
 - venting the substrate to atmosphere;
21. The method according to Claim 20, wherein filling a meniscus further comprises firing the substrate.
22. The method according to Claim 15, further comprising depositing a pillar on top of the via.
23. The method according to Claim 22, wherein depositing a pillar comprises;
 - affixing a mask to the substrate;
 - depositing a metal on top of the mask;
 - removing the mask after depositing the metal; and
 - coating the substrate with a ceramic.
24. The method according to Claim 23, further comprising dissolving the metal after the substrate has been coated with the ceramic.
25. The method according to Claim 23, wherein the ceramic coating is shorter than the pillar.

U.S. Express Mail Label No. [REDACTED] 26457574US

[REDACTED] Docket No. 047711-0280

26. The method according to Claim 15, further comprising covering the via with a cap.
27. The method according to Claim 26, wherein covering the via is done using an ion beam assist deposition process.
28. The method according to Claim 18, wherein a stencil is used in place of the screen.
29. A sensing apparatus comprising:
a substrate having a first area for a sensing element and a second area for electronics;
and
a via making electrical contact from the first area of the substrate to the second area of the substrate,
wherein the via is hermetically sealed from the first area of the substrate to the second area of the substrate.
30. A sensing apparatus according to Claim 29, wherein the via is filled with a conductive material.